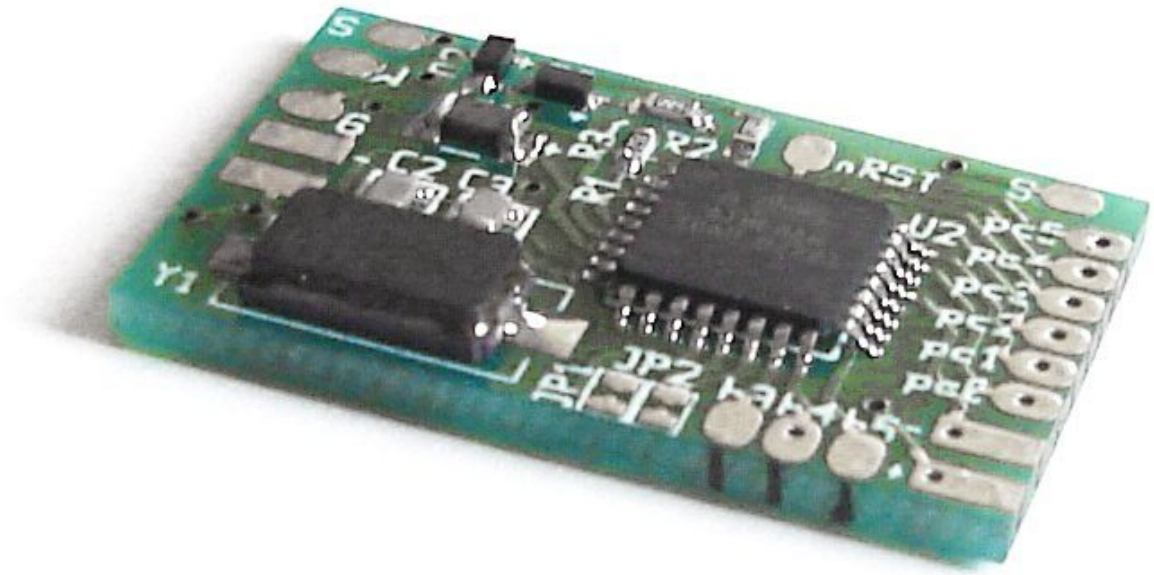
raphnet.net's

Nes/Snes/DB9 to USB

Pre-assembled PCB

(part no. #NSDB9PCB1)



User's Manual

English version

Manual no. #M_NDSB9PCB_ENG1

Table of Contents

0) Table of contents....2
1) Introduction....3
1.1) Product summary....3
1.2) Supported operating Systems....3
1.3) Supported controllers....3
2) Getting started....4
2.1) What you should have received....4
2.2) Required material (not included)....4
2.3) Recommended equipment....4
2.4) Overview of installation....5
3) Controller type selection....6
3.1) Enabling SNES mode....6
3.2) Enabling NES mode....6
3.3) Enabling DB9 mode....6
4) Assembly....7
4.1) Soldering USB wires (common to all controller types)....7
4.2) Soldering SNES controller wires....8
4.3) Soldering NES controller wires....8
4.4) Soldering DB9 controller wires....9
5) Installation....10
5.1) Installation under Windows....10
5.2) Installation under MacOS X....10
5.3) Installation under Linux....11
6) Operating notes....12
6.1) In SNES mode....12
6.2) In DB9 mode....12
7) Old wiring diagrams....13
7.1) PCB rev.C, SNES and ISP (In system programming)....13
7.2) PCB rev.C, color based wiring for NES and SNES....13
7.3) PCB rev.C, wiring for 2 buttons Atari style controllers....14
10) Copyright and Disclaimers....15
10.1) Copyright....15
10.2) Disclaimer....15
10.3) Revision history....15

1) Introduction

1.1) Product summary

This circuit converts one of the supported game controllers to a standard USB HID compliant input device. It can be installed inside a controller or used to build an adapter.

1.2) Supported operating Systems

Many operating systems support USB HID joysticks. This product is known to work with at least the following operating systems:

- Linux kernel 2.4 and 2.6
- Mac OS X
- Microsoft Windows 98/ME (recent version of Direct X recommended)
- Microsoft Windows 2000/XP/Vista

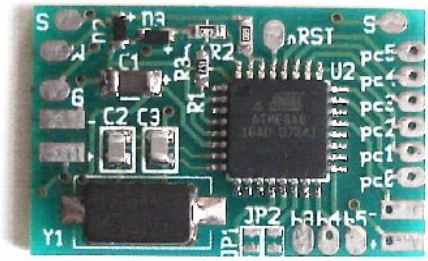
1.3) Supported controllers

- Snes controllers and Snes mouse (auto detected)
- Nes controllers
- Sega Genesis 3 and 6 button controllers
- Sega master system controllers and compatible two button joysticks such as Amiga digital joysticks.
- Atari 2600 one-button compatible joysticks.

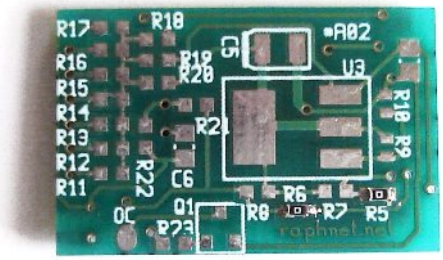
2) Getting started

2.1) What you should have received

1. One PCB with 10 components installed on the Top layer, and 2 installed on the bottom layer.



Top layer



Bottom layer

2.2) Required material (not included)

1. Soldering equipment.
2. Basic electronic tools. (cutters, wire stripper, tweezers)
3. Multimeter for testing continuity.
4. USB cable with an USB male connector (type A) on one side, and bare wires at the opposite side. You may cut a cable in two parts to obtain this.
5. If you plan to build an adapter (instead installing the circuit inside a controller), you will need a connector that mates with your controller. This can come from an extension cord, a broken console, or an electronic component store (likely for DB9 connectors).
6. Again if building an adapter, some kind of enclosure to protect the circuit is highly recommended. This is especially important to prevent the circuit from coming in contact with anything metallic such as a computer case. This could cause a short circuit which could likely cause damages to the circuit or your computer, depending on circumstances.

2.3) Recommended equipment

1. Desoldering braid (just in case)
2. Hot glue gun and Hot glue (to prevent the wires from eventually breaking at the point where they are soldered). Especially important if the wires may move.

2.4) Overview of installation

1. Start by carefully planning how you will install the circuit inside the controller (or your enclosure). Make sure you dont cut the wires too short and that the circuit wont be in the way when you put back the cover.
2. Configure the circuit for your controller type (see Chapter 3)
3. Install the USB wires (see Chapter 4, section 1)
4. Install your controller wires (see Chapter 4, section 2 and on)
5. Inspect for shorts. Double-checking with a multimeter is recommended if you have any doubts.
6. Test on a computer. If it does not work, double check everything and then contact me.
7. Install hot glue over the solder points.
8. Insulate any metal part (e.g. USB cable shield) which could come in contact with the Circuit. Use electric tape or hot glue.
9. Finish the installation. (Close enclosure)
10. Play!

3) Controller type selection

The circuit supports 3 different modes (SNES, NES and DB9 mode). The mode is selected by connecting (or not connecting) parts of JP1 and JP2. JP1 and JP2 are checked by the firmware at power-up or reset.

3.1) Enabling SNES mode

Snes mode is enabled by not connecting anything.

3.2) Enabling NES mode

Nes mode is enabled by connecting JP1 pads together.

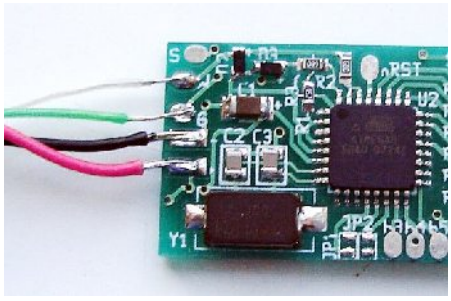
3.3) Enabling DB9 mode

DB9 mode (for Genesis, SMS, Atari and compatibles) is enabled by connecting JP1 and JP2 together as shown on the picture:

4) Assembly

4.1) Soldering USB wires (common to all controller types)

The USB standard dictates the color code that shall be used inside an USB cable. This means that normally, all you need to do is to solder the wires exactly as they are on the picture.

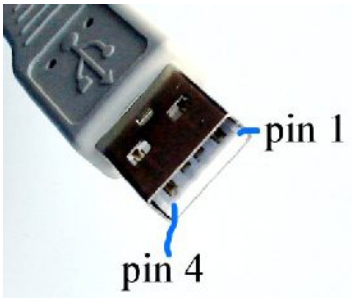


The White wire should be soldered to the pad labelled *W*, the green wire to the pad labelled *G*, the black wire to the pad labelled – ***(minus)***, and the red wire to the pad labelled ***+ (plus)***.

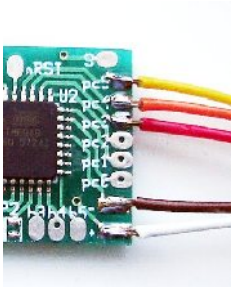
Warning: Some rare USB cables dont follow the standard color code. If the cable you use has additional wires, if any color is different, or if you have doubts, check the pinout with a multimeter. Mis-wiring may cause damage to your computer, to this circuit or to the controller.

Here is the standard USB pinout

Pin 1	Red	5 volts
Pin 2	White	D-
Pin 3	Green	D+
Pin 4	Black	Ground



4.2) Soldering SNES controller wires



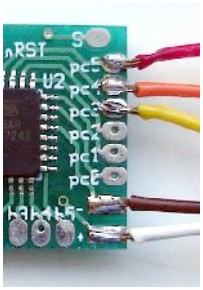
As far as I am aware, Nintendo brand controllers all use the same color code. Many clones also use this convention too, but not all. If your controller uses the standard color code, you can follow the diagram on the right. *(Note that the SNES and NES color codes are different)*.

If you're not sure about your controller, check it's pinout with a multimeter and use the table and picture below for wiring:

Pin	Function	Standard color	Connect to
1	5 volts	White	+
2	Clock	Yellow	PC5
3	Latch	Orange	PC4
4	Data	Red	PC3
7	Ground	Brown	-

Note: Pin numbers were arbitrarily assigned. They do not match any known standard or convention.

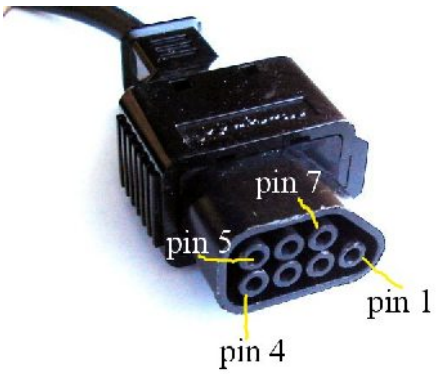
4.3) Soldering NES controller wires



As far as I am aware, Nintendo brand controllers all use the same color code. Many clones use this convention too, but not all. If your controller uses the standard color code, you can follow the diagram on the right. *(Note that the SNES and NES color codes are different)*.

If you're not sure about your controller, check it's pinout with a multimeter and use the table and picture below for wiring:

Pin	Function	Standard color	Connect to
1	Ground	Brown	-
2	Clock	Red	PC5
3	Latch	Orange	PC4
4	Data	Yellow	PC3
7	5 volts	White	+

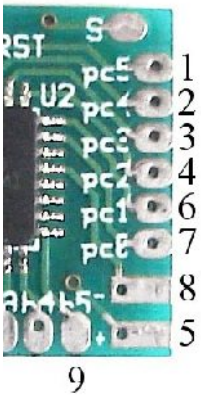


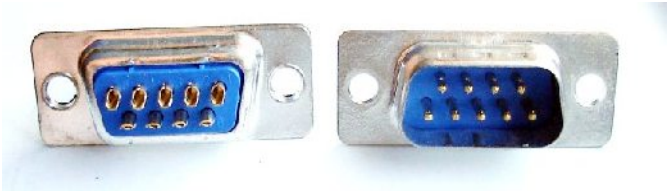
Note: Pin numbers were arbitrarily assigned.
They do not match any known standard or convention.

4.4) Soldering DB9 controller wires

There are too many different kind of controllers using DB9 connectors to talk about a standard color code. Fortunately, cutting your controller cable is far from necessary in this case. It is best to use easy to find solder cup DB9 connectors. The original controller can thus be left intact.

The picture on the right shows where to connect each DB9 pin on the board.

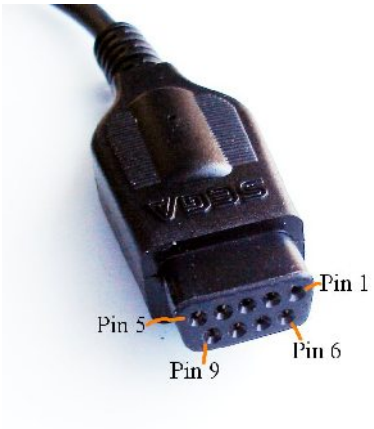




Solder cup DB9 male connectors

Here is a table summarizing what the wires are used for with different type of DB9 controllers.

Pin	**Genesis 3**	**Genesis 6**	**SMS**	**Atari 2600**
1	Up	Up or Z	Up	Up
2	Down	Down or Y	Down	Down
3	Left or 0	Left, 0 or X	Left	Left
4	Right or 0		Right	Right
5	+5volts			Not used
6	Button A or B		Button 1	Fire button
7	Select		Not used	+5v, 50mA max.
8	Ground			
9	Button Start or C		Button 2	Not used



5) Installation

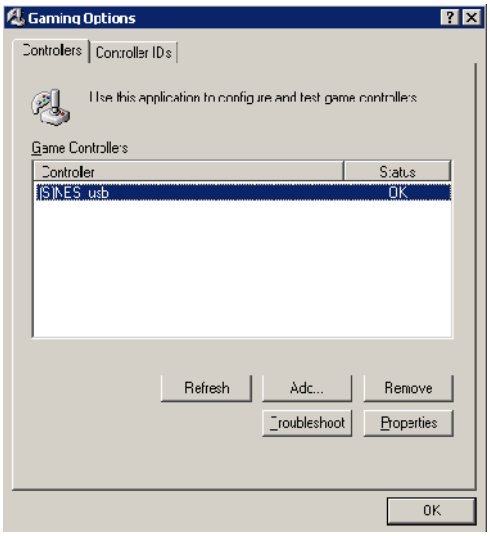
Up to now, all operating systems this product was tested with had native support for USB HID joysticks and gamepads. Most of the time, connecting the adapter is all that has to be done before starting your game. (and then of course, you configure the game to use joysticks).

But here are a few installation notes for different operating systems.

5.1) Installation under Windows

When you connect the adapter for the first time, depending on your Windows version, a pop up may appear requesting that you insert your windows installation cdrom. Follow the instructions. After installation completes, you may be required to reboot your computer.

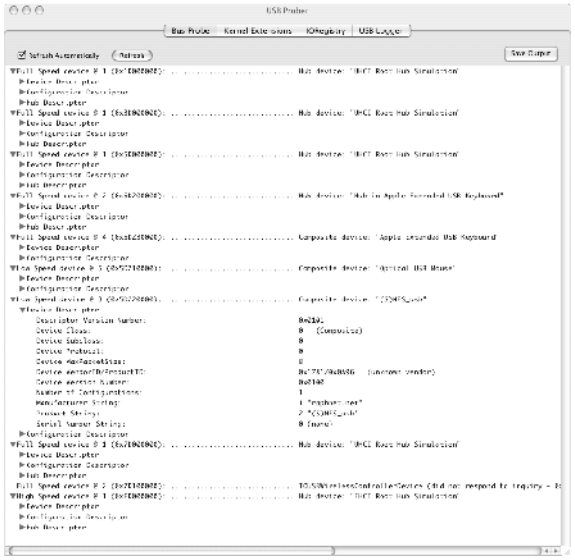
Once the drivers are installed, the controller should appear in Control Panel -> Game controllers/ Gaming options every time you connect the adapter.



5.2) Installation under Mac OS X

No installation instruction at the moment. No drivers are required, but the game or emulator you use must support USB Joysticks.

You may use USB Prober to check for the device presence.



USB Prober

5.3) Installation under Linux

Normally, the controller will work instantly. There are too many different Linux distributions to cover every possible scenarios, but here are a few ways to check if the adapter was detected correctly.

After connecting your adapter, check *dmesg* for a message such as this one:

```
[1439918.730644] usb 2-2.2: new low speed USB device using uhci_hcd and address 67
[1439918.862745] usb 2-2.2: configuration #1 chosen from 1 choice
[1439918.887690] input: raphnet.net (S)NES/Atari_USB as /class/input/input75
[1439918.887749] input: USB HID v1.01 Gamepad [raphnet.net (S)NES/Atari_USB] on usb-0000:00:1a.1-2.2
```

Make sure the usb, input, hid and joydev modules are loaded (or compiled into your kernel). The device should appear /proc/bus/input/devices:

```
# cat /proc/bus/input/devices
...
I: Bus=0003 Vendor=1781 Product=0a96 Version=0101
N: Name="raphnet.net (S)NES/Atari_USB"
P: Phys=usb-0000:00:1d.0-1.1/input0
S: Sysfs=/class/input/input72
U: Uniq=1000
H: Handlers=event3 js0
B: EV=b
B: KEY=ff0000 0 0 0 0 0 0 0 0 0
B: ABS=3
```

Notice the 'js0' handler above. If you have more than one controller, this could be *js1,* js2... If no *js*X handler is present, you need the *joydev* module.

For testing the buttons and directions, you can use the *jstest* tool. Under debian, this is in *the joystick* package.

```
# jstest ./js0
Driver version is 2.1.0.
Joystick (raphnet.net (S)NES/Atari_USB) has 2 axes (X, Y)
and 8 buttons (BtnX, BtnY, BtnZ, BtnTL, BtnTR, BtnTL2, BtnTR2, BtnSelect).
Testing ... (interrupt to exit)
Axes:  0:     0  1:     0 Buttons:  0:off  1:off  2:off  3:off  4:on   5:off  6:off 7:off
Axes:  0:     0  1:     0 Buttons:  0:off  1:off  2:off  3:off  4:off  5:off  6:on  7:off
```

6) Operating notes

6.1) In SNES mode

NES controller detection

If a NES controller is connected instead of an SNES controller, it should be auto-detected. Auto-detection works with original Nintendo controllers, but may be unreliable with certain imitations. In this case, the adapter should be used in NES mode.

Mouse support

When SNES mode is selected and an SNES mouse is connected instead of a regular controller, the adapter will act as a standard USB mouse instead of a joystick.

The SNES mouse supports 3 different speeds. The operating speed can be selected:

- High speed: Hold the right button down while connecting the mouse.
- Medium speed: Hold the left button down while connecting the mouse.
- Low speed: Hold the left and right buttons down while connecting the mouse.

The default speed is 'Low'. If the mouse (but not the adapter) is disconnected during use and re-connected later, the previous speed is used.

6.2) In DB9 mode

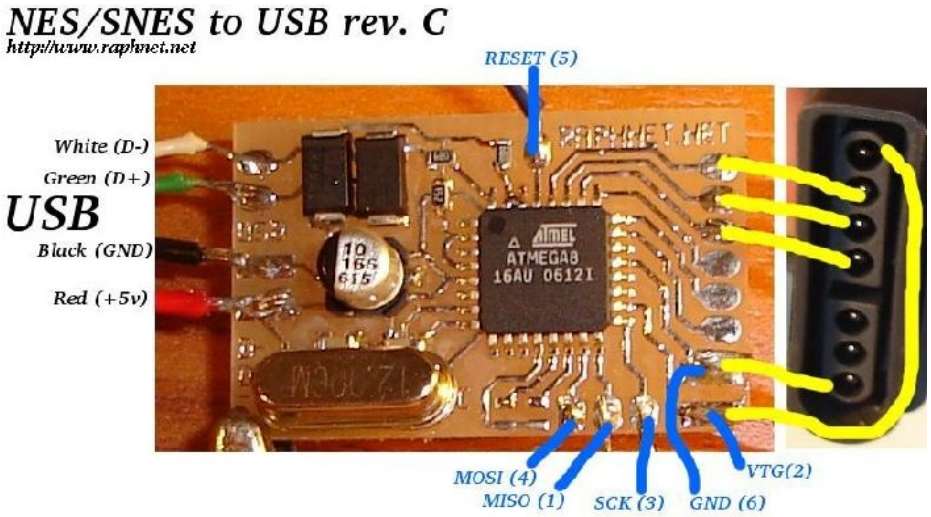
In this mode, the type of controller is auto-detected. At power-up (that is, when you connect the USB side of the adapter), a test is done to decide if the connected controller is a Genesis controller or and older SMS or Atari controller.

If no controller is connected, the adapter will think there is a two button SMS or Atari compatible controller. If you connect a Genesis controller later, only two buttons will work.

If a Genesis controller was detected, the adapter assumes it is a 3 button controller. But as soon as the X, Y or Z button is pressed alone, the adapter switches in 6 button mode. But this should be 100% transparent to the user.

7) Old wiring diagrams

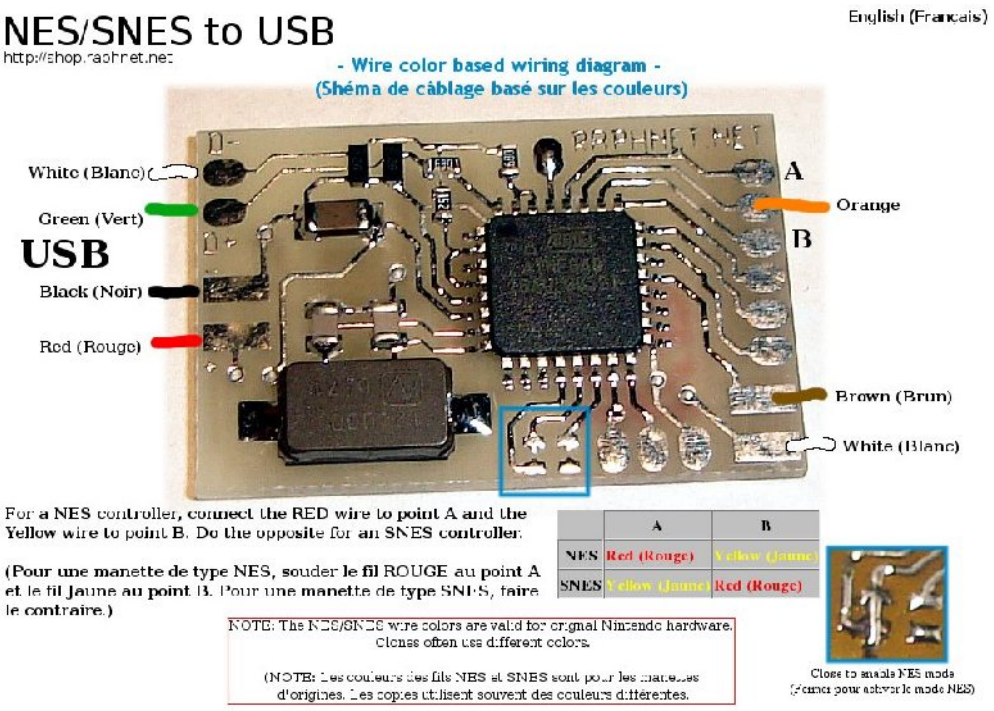
7.1) PCB rev.C, SNES and ISP (In system programming)



Note: The blue wires on the diagram above are for (re)programming the microcontroller. Useful if you want to customize the software.

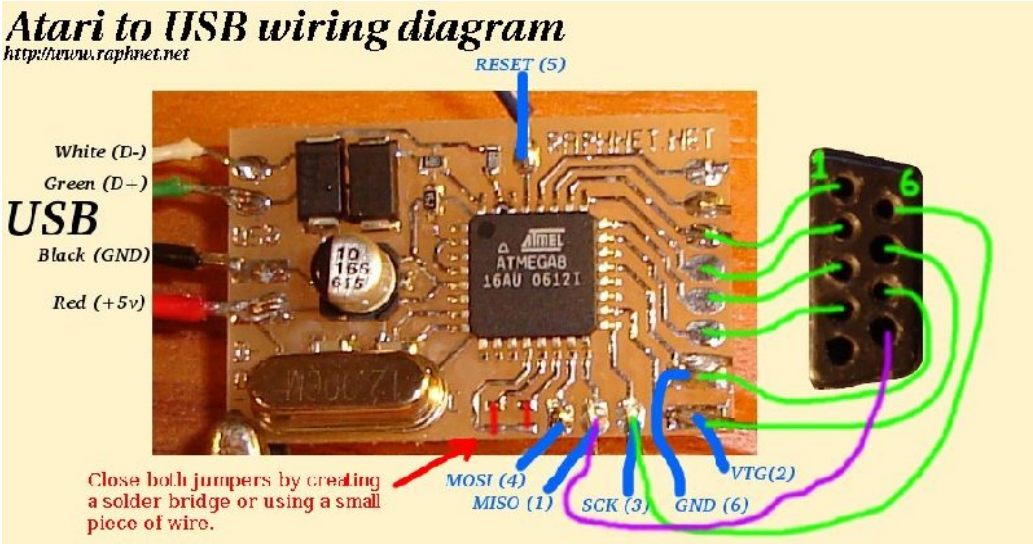
7.2) PCB rev.C, color based wiring for NES and SNES

There was some demand for a color based wiring diagram since it was easier to understand than the previous one. That's why I created this one.


NES/SNES to USB
http://shop.raphnet.net
English (Francais)
- Wire color based wiring diagram -
(Shéma de câblage basé sur les couleurs)
White (Blanc)
Green (Vert)
USB
Black (Noir)
Red (Rouge)
A
Orange
B
Brown (Brun)
White (Blanc)
For a NES controller, connect the RED wire to point A and the Yellow wire to point B. Do the opposite for an SNES controller.
(Pour une manette de type NES, souder le fil ROUGE au point A et le fil Jaune au point B. Pour une manette de type SNES, faire le contraire.)
A
B
NES
Red (Rouge)
Yellow (Jaune)
SNES
Yellow (Jaune)
Red (Rouge)
NOTE: The NES/SNES wire colors are valid for original Nintendo hardware. Clones often use different colors.
(NOTE: Les couleurs des fils NES et SNES sont pour les manettes d'origines. Les copies utilisent souvent des couleurs différentes.
Close to enable NES mode
(Fermé pour activer le mode NES)

7.3) PCB rev.C, wiring for 2 buttons Atari style controllers.

Before Genesis controllers were supported, the pinout was different. This was the diagram to follow. (**Important note:** The last firmware supporting this wiring scheme was version 1.4).



Note: The blue wires on the diagram above are for (re)programming the microcontroller. Useful if you want to customize the software.

10) Copyright, Disclaimer and History

10.1) Copyright

All the information, pictures, diagrams, tables and texts contained

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Trademarks that are mentioned in this manual are the property of their respective owners.

10.2) Disclaimer

Even thought I made great efforts and a lot of testing to make sure my products are safe, I cannot be held responsible for any damage(s) or loss(es) caused directly or indirectly by the use of my products, including but not limited to, loss of data, loss of profit, computer/server downtime, device and peripheral damage or failure.

While I believe that all the information contained in this manual is accurate, should damage occur because of an error in this manual, my responsibility will be limited to replacing my product if it is damaged.

10.3) Revision history

November 1, 2007	First version of this manual.